

# **L00 Studies**

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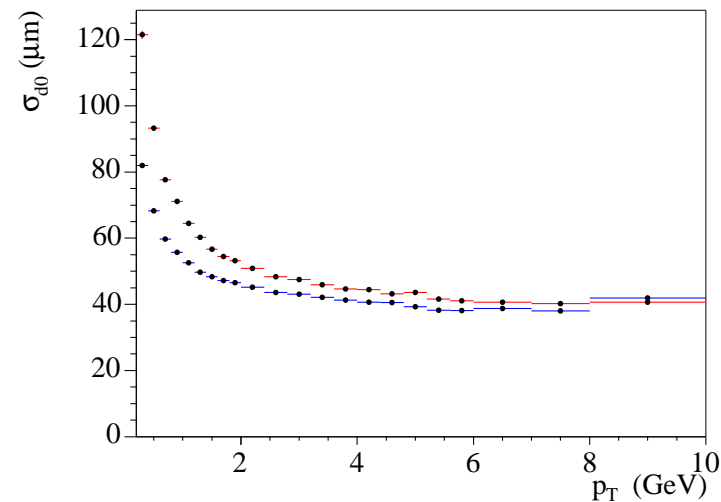
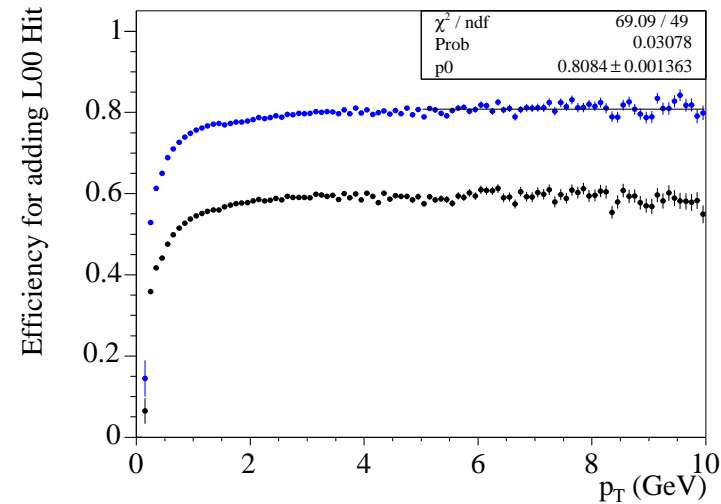
**J/Psi Physics Meeting**

December 2, 2003

# L00: Where we are

More than one year of work finally starting to pay dividends

- Clustering and alignment
  - Best clusters made by Production
  - Alignment to  $10\mu\text{m}$  level  
most ladders  $5\mu\text{m}$  level
- Efficiency tracks pointed into active area
  - Max efficiency 80.8%
  - Requiring high quality clusters: 59.2%
- Impact parameter at low momentum improved dramatically
- To do: people needed
  - Optimize clustering cuts/Finish alignment
  - Some efficiency might be recoverable
  - Serious study needed for physics use



# A Quick L00 Physics Study

## Study Impact of L00 on Physics Analysis

- Improvements to impact parameter/decay length resolution
  - Improvement in resolution
  - Reduction of tails
- Improvements in other track parameters( $\phi_0$ ...)
  - Investigate mass resolution
- Evaluate l00 efficiency in physics events

## Procedure

- Direct comparison of same events with and without L00
- Add L00 hits where possible
  - Used L00AddAndRedit: documented on tracking web page: for several months!
  - Used default quality cuts from Silicon Studies group: from meeting minutes  
An option in L00AddAndRefit
  - Code used added to BottomTools: CharmMods and other frameworks

## DataSet

- Used a portion of the MIT B -  $J/\psi$  strip

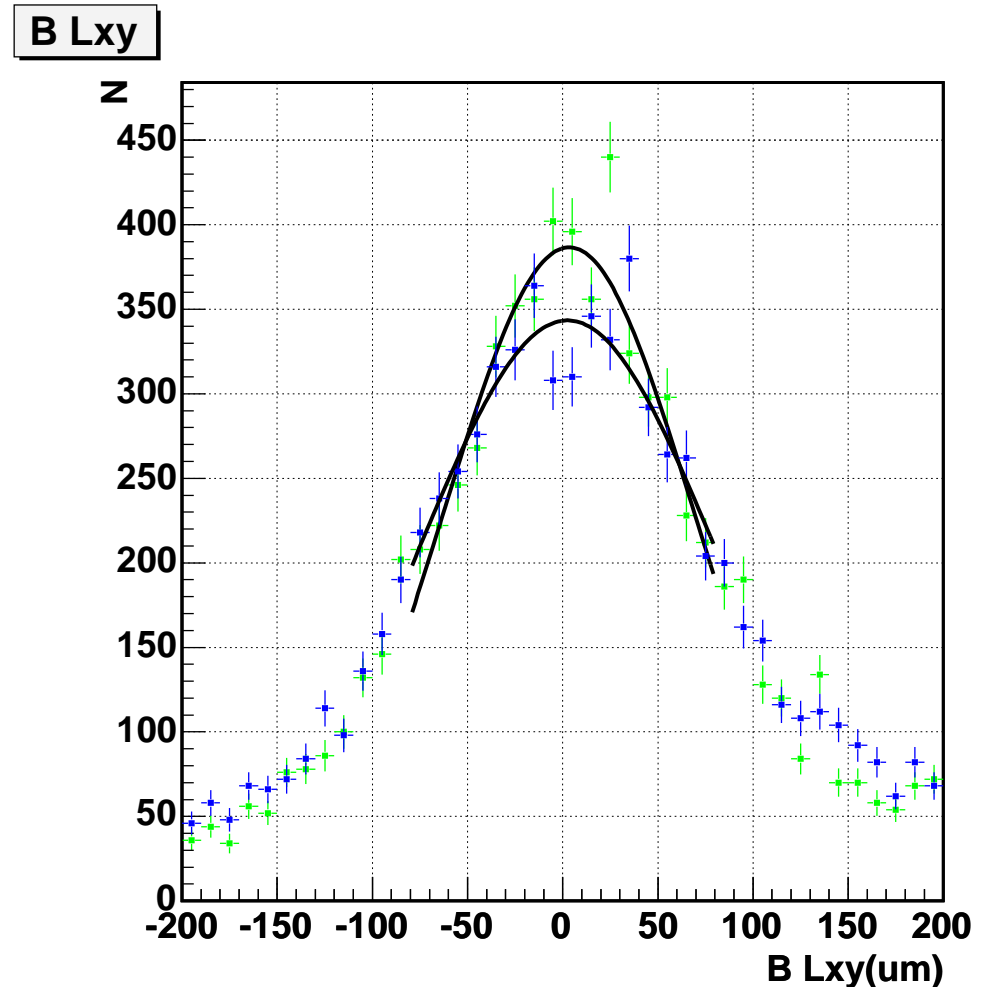
# Efficiency and Lxy Resolution

## Efficiency

- 62.4% of tracks assigned at least on 100 hit that passes quality cuts

## Lxy Resolution and tails

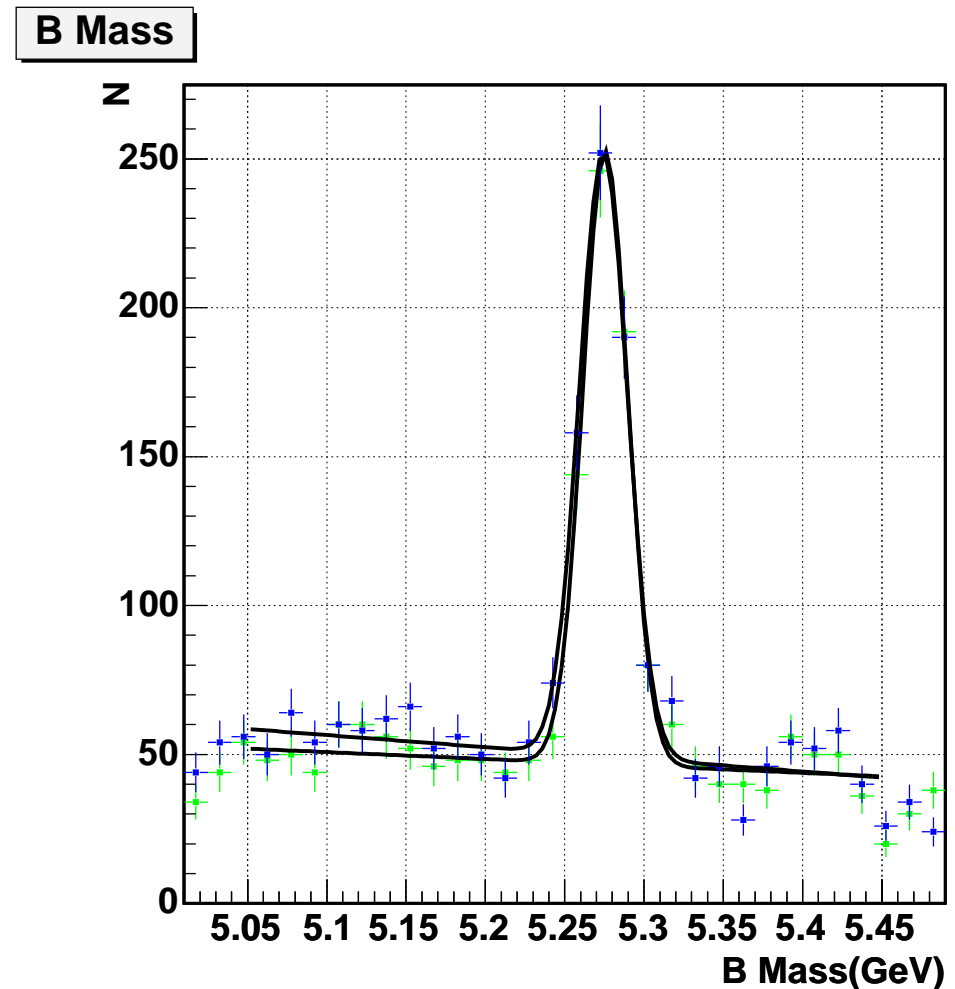
- Improvement in Lxy resolution
  - Fit area  $\pm 80\mu\text{m}$  from the center of the distribution
  - With L00:  $64 \pm 3\mu\text{m}$
  - Without L00:  $78 \pm 4\mu\text{m}$
- Tails
  - Comparison of tail to central  $3\sigma$
  - With L00: 1702 or 10.7% beyond  $200\mu\text{m}$
  - Without L00: 1842 or 11.2% beyond  $200\mu\text{m}$
  - Amount in central area went down slightly



# Mass and Background Reduction

## Mass resolution improvement

- Fit to Gaussian + linear: not fancy
  - After basic quality cuts
  - With L00:  $14.3 \pm 1.0 \text{ MeV}$
  - Without L00:  $15.2 \pm 1.0 \text{ MeV}$
  - Tried the fit with several  $L_{xy}$  and quality cuts: result was robust
  - Remember - same events
  - Mass resolution was also improved 2MeV by new COT code and alignment
- Reduction in background: apply  $2\sigma$   $L_{xy}$  cut:  $\sim 120\mu\text{m}$ 
  - Background down by 24 events - 5% Under peak
  - Signal the same
  - Improvement may be significant
  - Looser  $L_{xy}$  cut makes effect more dramatic



# Conclusions

Time to start using L00 for physics!

- Considerable study needed
- Next on my list: d0 of third track to 2 track intersection